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APPLICATION NUMBER: *60/478,254*
FILING DATE: *June 13, 2003*
RELATED PCT APPLICATION NUMBER: *PCT/US04/18654*

Certified by

Jon W Dudas

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EU783435055US

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
John D.	Martin	Wichita Falls, Texas

☐ Additional inventors are being named on the _____ separately numbered sheets attached hereto

TITLE OF THE INVENTION (500 characters max)

FILTER END CAP DESIGN

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification	Number of Pages 4	☐ CD(s), Number	
☒ Drawing(s)	Number of Sheets 4		
☐ Application Data Sheet. See 37 CFR 1.76		☐ Other (specify)	

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☒ Applicant claims small entity status. See 37 CFR 1.27.

☒ A check or money order is enclosed to cover the filing fees

☒ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 502112/jmar-0400pv

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($): 80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

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Respectfully submitted,

SIGNATURE _____ Date Ju6/13/2003

TYPED or PRINTED NAME Roger N. Chauza REGISTRATION NO. (if appropriate) 29,753

TELEPHONE (972) 518-1414 Docket Number: JMAR-0400PV

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JMAR-0400PV

Prov. Patent

FILTER END CAP DESIGN

By:

John D. Martin

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Roger N. Chauza (Name of Depositor)

Signature

Date of Signature: 6.13, 2003

Technical Field Of The Invention

The present invention relates in general to filters, and more particularly to radial flow filters of the type that are fluidizable.

Detailed Description

Fig. 1 illustrates the filter 10, although in practice it may be much longer in length, namely about five foot. The filter 10 includes a top end cap12 and a bottom end cap 14. Both top and bottom end caps 12 and 14 may be constructed in an identical manner, using the same mold. The end caps can be constructed of plastic, metal or other suitable material.

Supported between the end caps 12 and 14 is an outer cylindrical case 16 that is supported between respective annular recesses in the top and bottom end caps 12 and 14. The case 16 can be welded or threaded to the top and bottom end caps 12 and 14 to constrain the perforated cylinders 22 and 32 between the end caps 12 and 14. O-rings 18 and 20 provide a fluid seal between the case 16 and the top and bottom end caps 12 and 14.

The top and bottom end caps 12 and 14 further include other respective annular recesses for supporting therebetween an outer perforated cylinder 22. The outer perforated cylinder 22 may be plastic or metal with large openings 24 formed therein. The openings 24 are formed only in the bottom half of the outer perforated cylinder 22. A screen 26 is attached to the inside surface of the outer perforated cylinder 22. O-rings 28 and 30 provide a fluid seal between the outer perforated cylinder 22 and the respective top and bottom end caps 12 and 14.

An inner perforated cylinder 32 is supported within respective bores (not shown) formed centrally in the top and bottom end caps 12 and 14. O-rings (not shown) provide a fluid seal between the ends of the top and bottom ends of the inner perforated cylinder 32 and the respective bores of the top and bottom end caps 12 and 14. Large perforations 34 are formed in the inner perforated cylinder 32 from the top to the bottom thereof. A screen 36 is attached to the outer surface of the inner perforated cylinder 32.

An annular chamber 38 is located between the outer screen 36 of the inner perforated cylinder 32 and the inner screen 26 of the outer perforated cylinder 22. Media beads 40 partially fill the annular chamber 38, called the media chamber 38. The media beads 40 are larger in diameter than the screens 26 and 32. The media beads 40 can be injected or removed from the media chamber 38 by way of a channel 44 located in the top end cap 14 or a channel 42 located in the bottom end cap 14. During the media coacting or filter stage, the media beads 40 are located in the bottom of the filter 10. During a fluidization stage, the media beads are lifted to the upper portion of the media chamber 38.

The inner perforated cylinder 32 has a plug 46 located centrally therein to prevent fluid flow through the central core of the inner perforated cylinder 32. Located below the plug 46 inside the inner perforated cylinder 32 are a number of check valves, one shown as reference character 48 as a ball-type check valve to allow the downward flow of fluid inside the inner perforated cylinder 32, but prevent upward flow of fluid. The ball opening within the check valves is smaller in diameter than that of the check valve located below it. The plate in which the ball opening is formed also has bypass orifices to allow the passage of fluid therethrough even

when the ball is closed in its respective opening. The ball openings and check valves function to allow the sequential fluidization of the media beads 40. The bottom end cap 14 includes a funnel-shaped surface (not shown) formed at the bottom of the media chamber 38. This upwardly slanted surface facilitates fluidization of the media beads 40. Reference is made to U.S. Pat. 6,322,704 by Martin for a further description of the fluidization process in a radial flow fluidizable filter. The disclosure of such patent is incorporated herein by reference.

Located above the plug 46 near the top of the inner perforated cylinder 32 is a ball and seat valve 50. The ball is captured by a screen cage fastened to the upper surface of the seat plate of the valve 50. The cage prevents the ball from being carried away with the backwash fluid.

The upper end of the inner perforated cylinder 32 opens into a central port 52 formed within the top end cap 12. In like manner, the bottom end of the inner perforated cylinder 32 opens into a central port 54 formed in the bottom end cap 14.

Formed in the top and bottom end caps 12 and 14 are respective annulus ports 56 and 58. The top port 56 opens into an annular channel 60 formed in the top end cap 12. Similarly, the bottom port 58 opens into an annular channel 62 formed in the bottom end cap 14. The annular channels 60 and 62 are in fluid communication with an annular chamber 64 located between the outer surface of the outer perforated cylinder 12 and the inside surface of the case 16.

Fig. 2 illustrates the filter 10 during a filter stage where particulate matter is removed from the influent. The influent is coupled via external piping and valve arrangement to the central inlet port 52 as well as the annulus inlet port 56. The influent is forced downwardly into the top of the annular media chamber 38 to push the media 40 downwardly to the bottom of the chamber 38. In addition, any influent that passes through the annular column of media particles is effectively filtered. Influent also passes into the annulus port 56 and around the annular chamber 64 and through the bottom openings in the outer perforated cylinder 22. This influent passes radially through the media 40 and is filtered. The filtered influent passes through the media 40 and through the openings in the inner perforated cylinder 34 and downwardly in the core of the inner perforated cylinder 34 to the central outlet port 54. In this configuration, the media ports 44 and 42 are capped or otherwise valved to a closed position. The bottom annular chamber port 58 is also capped or valved to a closed porition.

The filter process continues until the media has accumulated particulate matter to the extent that the pressure in forcing the influent into the filter 10 increases above a predefined threshold. In this event, a backwash procedure can be instituted.

The backwash stage is shown in Fig. 3. Here, the external valving arrangement is switched so that the backwash fluid enters the filter 10 via the bottom central port 54. The backwash fluid is forced into the central core of the inner perforated cylinder 32. The check valves 48 are forced closed by the pressure of the backwash fluid. The backwash fluid is thus forced to flow through the orifices in the check valve plates and outwardly through the openings

34 in the inner perforated cylinder 32. Reference is made to U.S. Pat. No. 6,322,704 for the structure of the check valves 48 in the inner core of the perforated cylinder 32 that allows sequential fluidization of the media 40. In any event, the backwash fluid fluidizes the media 40 and separates the particulate matter from the media 40. The media is cleaned and is raised to the upper end of the annular media chamber 38. The backwash fluid and the particulate matter are carried upwardly back into the inner core of the upper half of the inner perforated cylinder 32 and out of the upper most ball/seat 50. The backwash fluid and particulate matter are carried out of the central port 52. The upper annulus port 56 may be valved to a closed position, as shown.

Fig. 4 illustrates another embodiment of the top and bottom end caps according to the invention.

What Is Claimed Is:

1. An end cap for a filter, comprising:
an annular structure having a large diameter annular recess and a smaller-diameter recess;
a central bore formed through the end cap;
a funnel-shaped surface located between the central bore and the smaller-diameter recess;
an annular channel formed around the end cap, and a bore formed from an end surface of the end cap to the annular channel; and
a bore formed through said end cap from the end surface to the funnel-shaped surface.

FIG. 1

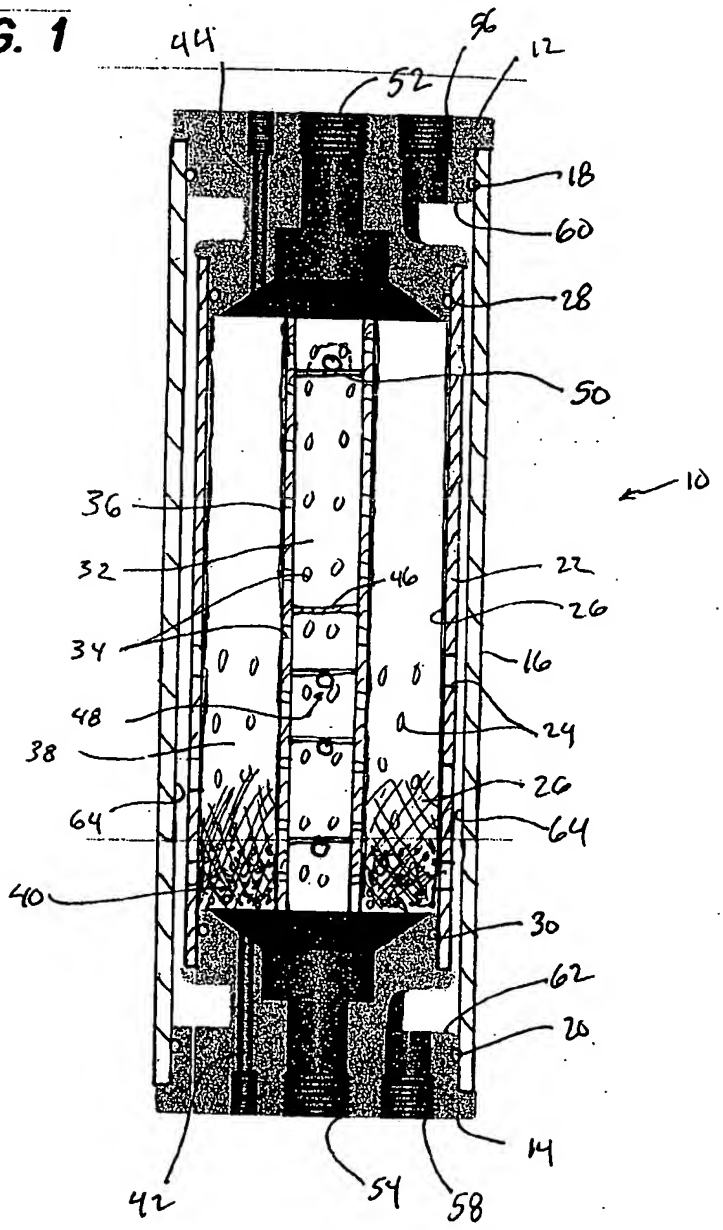
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FIG. 2

FILTER STAGE

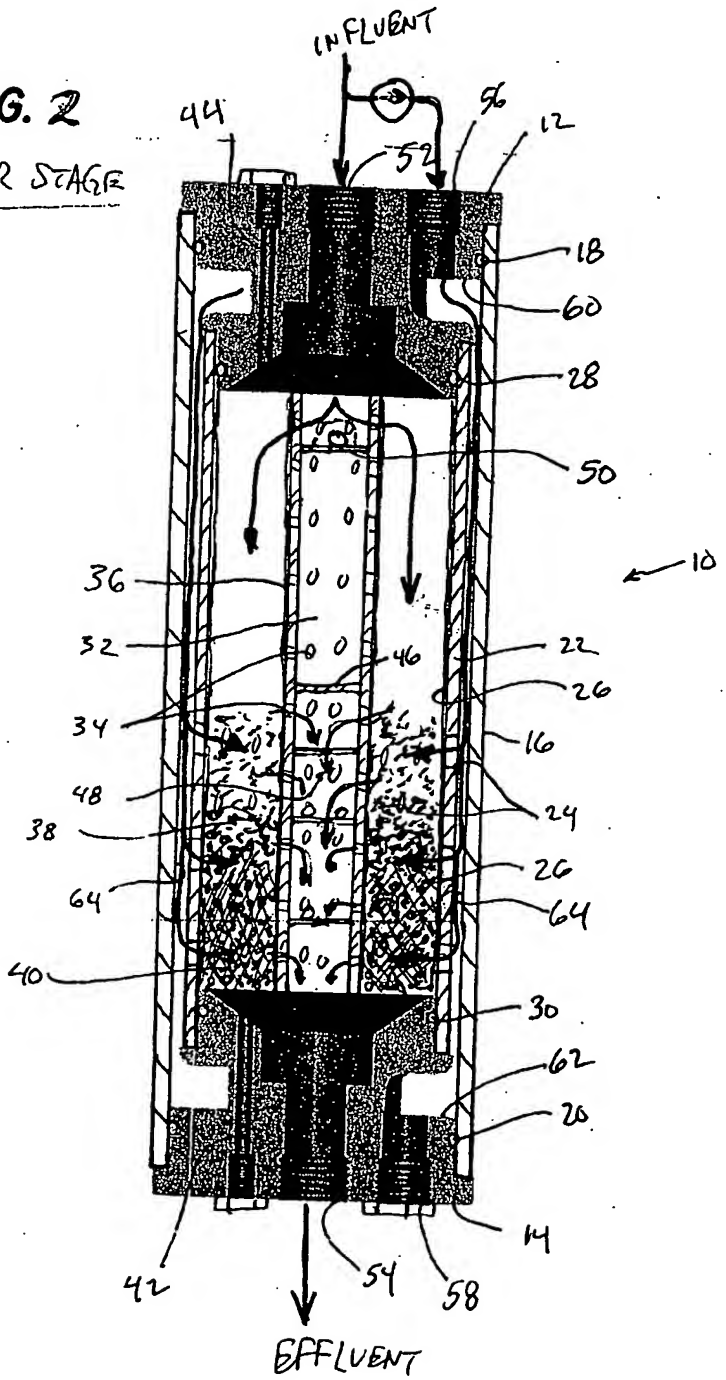

FIG. 3

BACKWASH STAGE

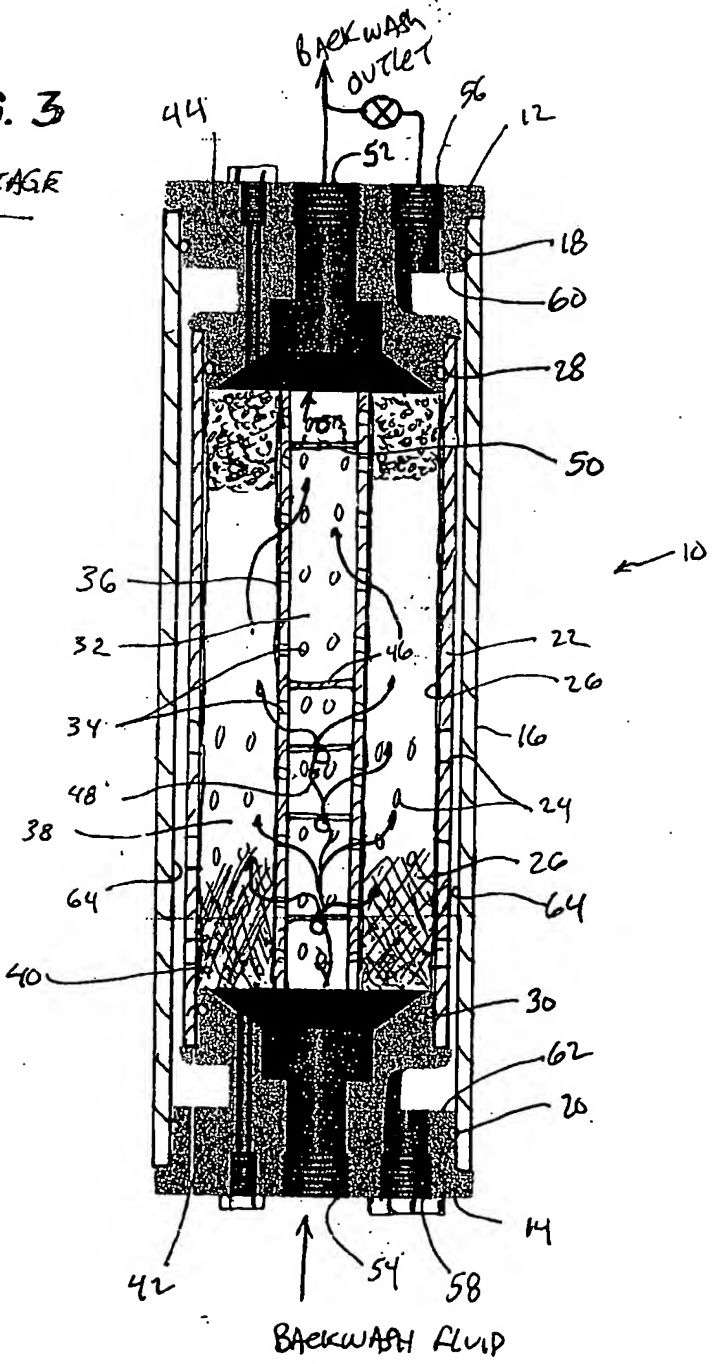

FIG. 4